



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

SLOT: F2+TF2

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

Programme Name & Branch : B.TECH (CSE)
 Course Code and Course Name : BCSE308L - COMPUTER NETWORKS
 Faculty Name(s) : COMMON TO ALL
 Class Number(s) : COMMON TO ALL
 Date of Examination : 10-10-2025
 Exam Duration : 90 minutes Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)
 CO3: Identify and analyze error and flow control mechanisms in data link layer.
 CO4: Design sub-netting and analyze the performance of network layer with various routing protocols

Q. No	Question	Module	Marks	CO
1.	A) A Go-Back-n ARQ protocol is used with a sender window size of 8 and a sequence number range of 512. The receiver is expecting sequence number 100. a) List all possible sequence numbers that can be in the sender's window. b) If the sender transmits 3 packets and the 2nd packet is lost, explain how the retransmission will occur.	3	5	CO3
	B) Explain why CSMA/CA is preferred over CSMA/CD in wireless networks. Provide at least two reasons and illustrate your answer using a scenario, such as a university classroom with 50 laptops connected to Wi-Fi, where students are simultaneously submitting assignments, streaming lectures, and downloading resources. Include a communication diagram showing how CSMA/CA prevents collisions than CSMA/CD.		5	
2.	A) An ISP is granted a block of addresses starting with 150.200.0.0/16. The ISP needs to distribute these addresses to several groups of customers as follows: The first group has 64 customers; each customer needs 256 addresses	4	7	CO4



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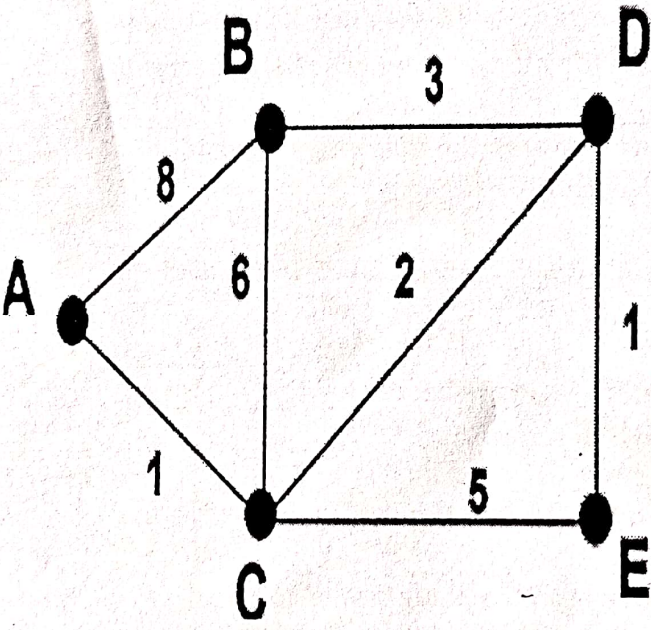
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	<p>The second group has 128 customers; each customer needs 64 addresses The third group has 32 customers; each customer needs 512 addresses The fourth group has 16 customers; each customer needs 1024 addresses Draw a subnet allocation diagram showing how the 150.200.0.0/16 block is divided among all groups.</p> <p>B) A company has the private network 192.168.10.0/24 and is assigned a Public IP 203.0.113.5 by the ISP. All employees need Internet access. Explain how NAT will translate the private IPs to the public IP when accessing the Internet with NAT Address translation table.</p>			
3.	<p>An IPv4 datagram has arrived with the following information in the header (in hexadecimal):</p> <p style="text-align: center;">0x47 00 00 40 00 03 58 50 20 06 00 00 8D 2A 05 00 A4 0B 0F 03</p> <p>a. Are there any optional field in the header field? b. Is the packet corrupted? c. Is the packet fragmented? d. What is the size of the data? What is a upper layer Protocol? e. How many more routers can the packet travel to? f. What is the identification number of the packet? g. What is the type of service? h. If the packet is being sent over a network with a maximum transmission unit (MTU) of 40 bytes, will fragmentation occur? Explain. i. Write the source and destination IP address and convert into binary and also identify their class and the subnet mask (2)</p>	4	3	CO4
4.	<p>A smart city authority is setting up a sensor network to monitor traffic congestion at major junctions. Each junction is represented as a node in the network, and the links between them represent data communication channels. The numeric value on each link indicates the cost of transmitting traffic data between the two junctions (this cost could be based on</p>	5	10	CO4





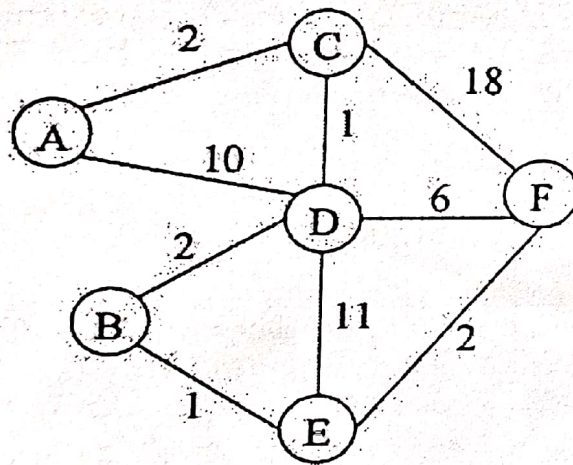
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	<p>bandwidth usage, delay, or energy consumption). The control centre, located at Node A, must efficiently collect traffic updates from all other junctions with the least transmission cost. To determine this, the city engineers decide to apply Dijkstra's Least-Cost Algorithm.</p> <p>Consider a packet-switched network with Node A as the source. Using Dijkstra's shortest path (least-cost) algorithm, compute the least-cost paths from Node A to all other nodes. (6)</p>  <pre> graph LR A((A)) --- 8 B((B)) A --- 1 C((C)) B --- 3 D((D)) B --- 6 C C --- 2 D C --- 5 E((E)) D --- 1 E </pre> <p>a. Why is Dijkstra's Algorithm suitable for this traffic monitoring scenario instead of Bellman-Ford? (2) b. If the communication cost of one link suddenly increases (e.g., due to congestion), explain how it affects the least-cost paths and how the algorithm would adapt. (2)</p>			
5.	<p>In a 5G-enabled smart hospital, each department have Administration, ICU, Radiology, Pharmacy, Emergency and Outpatient is equipped with an intelligent router forming a packet-switched network. The communication links between these departments have associated costs that reflect bandwidth usage, latency, or congestion. (Map the node according to the sequence to departments).</p>	5	10	CO4



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Consider Administration (Node A) as the source, with direct links to Radiology and Pharmacy and other inter-department links as defined. Apply the Bellman-Ford algorithm with A as the source vertex to determine the least-cost paths to all other departments. Show all intermediate steps of distance vector updates, construct the routing table at Node A after each iteration, and indicate the final shortest paths. (6)



- Suppose a link failure or oscillations in link cost occurs between any two departments (A→D), what is the effect of DV? (2)
- Suggest what are all the solutions can be applied in this hospital network to prevent routing loops and accelerate convergence for Q2.a. Apply any one. (2)
